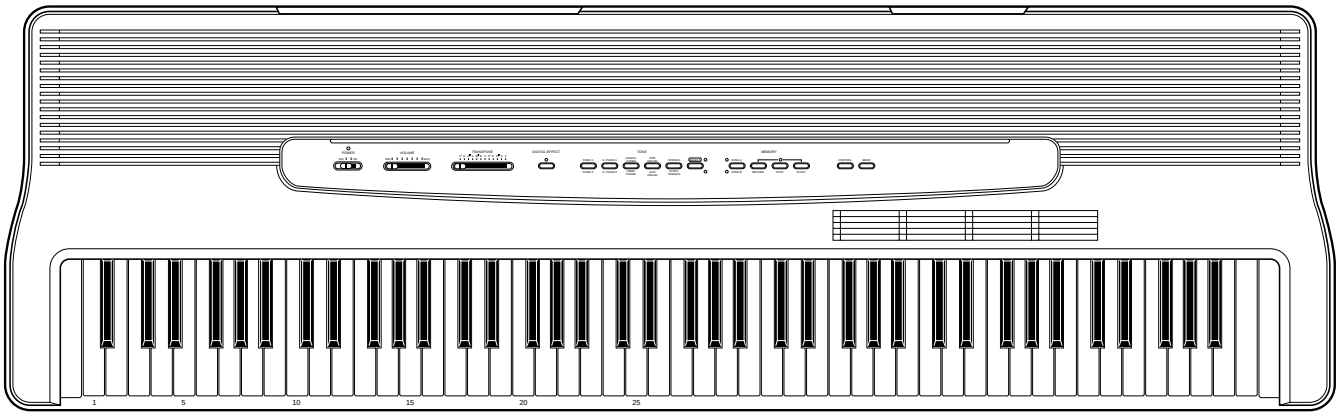
CASIO®

Service Manual

(without price)

CPS-85



CPS-85

INDEX

ELECTRONIC KEYBOARD

CONTENTS

Page

Specifications 1
Block Diagram 3
Circuit Description 4
Major Waveforms 11
Printed Circuit Boards 12
Schematic Diagrams 13
Exploded View 19
Parts List 21

SPECIFICATIONS

GENERAL

Keyboard: 88 full size keys with initial touch response

Polyphony: 24 notes maximum

Tones: 10 (with layering)

Tuning curves: 3 types (preset for each tone)

Digital effects: REVERB

Demo tunes

Number of tunes: 10

Titles:
1. Grande valse brillante
2. Turkish March
3. One-Eighty
4. Opaque Mist
5. Harmonious blacksmith
6. Dream Sequence
7. Fugue in G minor
8. Moveable Blues
9. Rainbow
10. Ave Maria

Playback: Repeat sequential play of all tunes; playback always starts from beginning of tune

Manual memory

Type: Real-time recording and playback

Number of songs: 2 (SONG A, SONG B)

Capacity: Approximately 1,200 notes (SONG A + SONG B)

Back-up: Power supplied by batteries or AC adaptor

Pedal: Damper

Other features Transpose (±1 octave, semitone steps)
Tuning (adjustable, A4 = 440 Hz ± 50 cents)

MIDI: 8-channel multi-timbre reception

Speakers: 14 cm × 2 (6 W + 6 W)

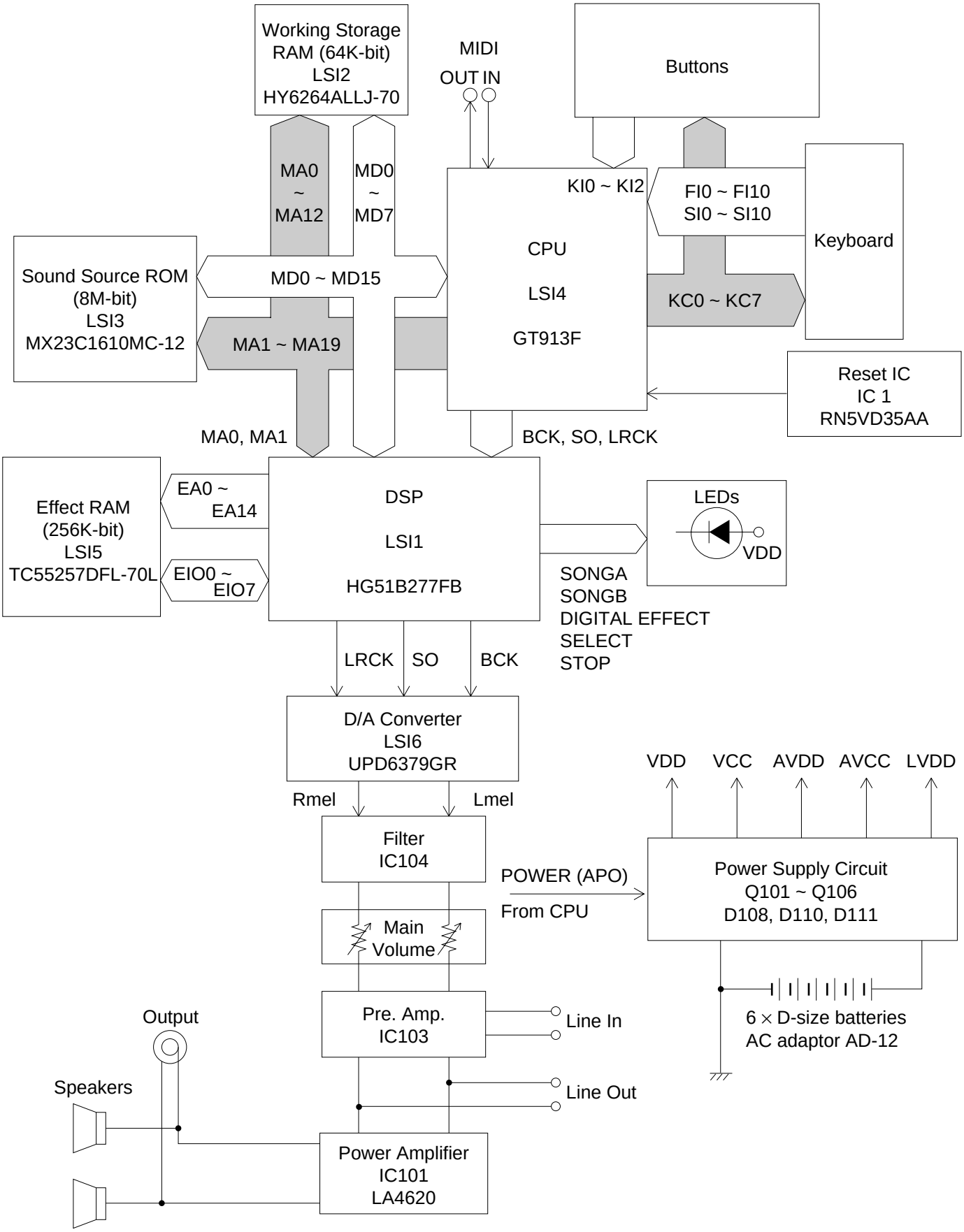
Terminals: PHONES (standard stereo jack × 1)
LINE OUT (standard mono jack × 2)
Output impedance: 1.0 KΩ
Output voltage: 1.5 V (RMS) MAX
LINE IN (standard mono jack × 2)
Input impedance: 47 KΩ
Sensitivity: 200 mV
MIDI OUT/IN (DIN jack × 2)

	DAMPER PEDAL (standard mono jack × 1) DC 12 V (DC jack × 1)
Power supply	Dual power supply system
Batteries:	6 D-size batteries
Battery life:	Approximately 4 hours on manganese batteries
AC adaptor:	AD-12
Auto power off:	Turns power off approximately 5 minutes after last key operation. Enabled under battery power only, can be disabled manually.
Power consumption:	18 W
Dimensions (HWD):	100 × 1372 × 414 mm (without stand) (3-15/16 × 54-1/16 × 16-5/16 inches)
Weight:	Without stand and excluding batteries 16.8 kg (37.1 lbs)

ELECTRICAL

Current drain with 12 V DC:		
No sound output		240 mA ± 20 %
Maximum volume		
with 24 keys from C1 to B2 pressed in Jazz organ tone		2050 mA ± 20 %
Volume: maximum, Touch response: maximum		
Phone output level (Vrms with 8 Ω load each channel):		
with key E3 pressed in Jazz organ tone	L-ch	60 mV ± 20 %
	R-ch	65 mV ± 20 %
Speaker output level (Vrms with 4 Ω load each channel):		
with key E3 pressed in Jazz organ tone	L-ch	860 mV ± 20 %
	R-ch	920 mV ± 20 %
Lineout output level (Vrms with 47 kΩ load each channel):		
with key B5 pressed in Jazz organ tone	L-ch	140 mV ± 20%
	R-ch	160 mV ± 20%
Minimum operating voltage:		6.5 V

BLOCK DIAGRAM

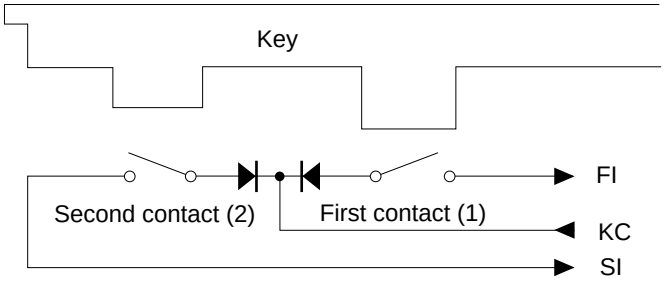


CIRCUIT DESCRIPTION

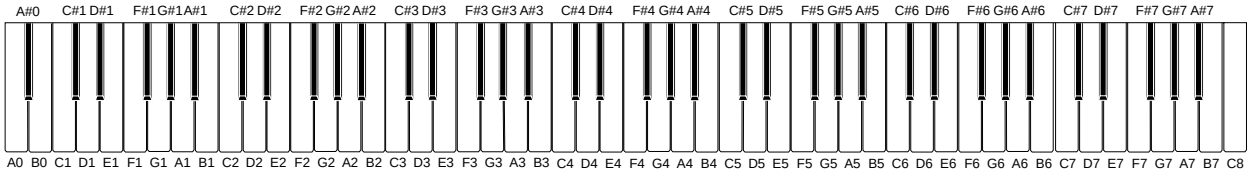
KEY MATRIX

	KC0	KC1	KC2	KC3	KC4	KC5	KC6	KC7
FI0	A0 (1)	A#0 (1)	B0 (1)	C1 (1)	C#1 (1)	D1 (1)	D#1 (1)	E1 (1)
SI0	A0 (2)	A#0 (2)	B0 (2)	C1 (2)	C#1 (2)	D1 (2)	D#1 (2)	E1 (2)
FI1	F1 (1)	F#1 (1)	G1 (1)	G#1 (1)	A1 (1)	A#1 (1)	B1 (1)	C2 (1)
SI1	F1 (2)	F#1 (2)	G1 (2)	G#1 (2)	A1 (2)	A#1 (2)	B1 (2)	C2 (2)
FI2	C#2 (1)	D2 (1)	D#2 (1)	E2 (1)	F2 (1)	F#2 (1)	G2 (1)	G#2 (1)
SI2	C#2 (2)	D2 (2)	D#2 (2)	E2 (2)	F2 (2)	F#2 (2)	G2 (2)	G#2 (2)
FI3	A2 (1)	A#2 (1)	B2 (1)	C3 (1)	C#3 (1)	D3 (1)	D#3 (1)	E3 (1)
SI3	A2 (2)	A#2 (2)	B2 (2)	C3 (2)	C#3 (2)	D3 (2)	D#3 (2)	E3 (2)
FI4	F3 (1)	F#3 (1)	G3 (1)	G#3 (1)	A3 (1)	A#3 (1)	B3 (1)	C4 (1)
SI4	F3 (2)	F#3 (2)	G3 (2)	G#3 (2)	A3 (2)	A#3 (2)	B3 (2)	C4 (2)
FI5	C#4 (1)	D4 (1)	D#4 (1)	E4 (1)	F4 (1)	F#4 (1)	G4 (1)	G#4 (1)
SI5	C#4 (2)	D4 (2)	D#4 (2)	E4 (2)	F4 (2)	F#4 (2)	G4 (2)	G#4 (2)
FI6	A4 (1)	A#4 (1)	B4 (1)	C5 (1)	C#5 (1)	D5 (1)	D#5 (1)	E5 (1)
SI6	A4 (2)	A#4 (2)	B4 (2)	C5 (2)	C#5 (2)	D5 (2)	D#5 (2)	E5 (2)
FI7	F5 (1)	F#5 (1)	G5 (1)	G#5 (1)	A5 (1)	A#5 (1)	B5 (1)	C6 (1)
SI7	F5 (2)	F#5 (2)	G5 (2)	G#5 (2)	A5 (2)	A#5 (2)	B5 (2)	C6 (2)
FI8	C#6 (1)	D6 (1)	D#6 (1)	E6 (1)	F6 (1)	F#6 (1)	G6 (1)	G#6 (1)
SI8	C#6 (2)	D6 (2)	D#6 (2)	E6 (2)	F6 (2)	F#6 (2)	G6 (2)	G#6 (2)
FI9	A6 (1)	A#6 (1)	B6 (1)	C7 (1)	C#7 (1)	D7 (1)	D#7 (1)	E7 (1)
SI9	A6 (2)	A#6 (2)	B6 (2)	C7 (2)	C#7 (2)	D7 (2)	D#7 (2)	E7 (2)
FI10	F7 (1)	F#7 (1)	G7 (1)	G#7 (1)	A7 (1)	A#7 (1)	B7 (1)	C8 (1)
SI10	F7 (2)	F#7 (2)	G7 (2)	G#7 (2)	A7 (2)	A#7 (2)	B7 (2)	C8 (2)
KI0	DIGITAL EFFECT	PIANO 1/ PIANO 2	E.PIANO 1/ E.PIANO 2	HARPSIC-HORD/ VIBRAPH-ONE	PIPE ORGAN/ JAZZ ORGAN	STRINGS/ SYNTH STRINGS	SELECT	SONG A/ SONG B
KI1	RECORD	CONTROL	DEMO	TRANSPO-SE F#	TRANSPO-SE G#	TRANSPO-SE A#	TRANSPO-SE D	TRANSPO-SE E
KI2	STOP	START	TRANSPO-SE G	TRANSPO-SE A	TRANSPO-SE B	TRANSPO-SE C#		

Note: Each key has two contacts,
the first conatct (1) and second contact (2).



NOMENCLATURE OF KEYS



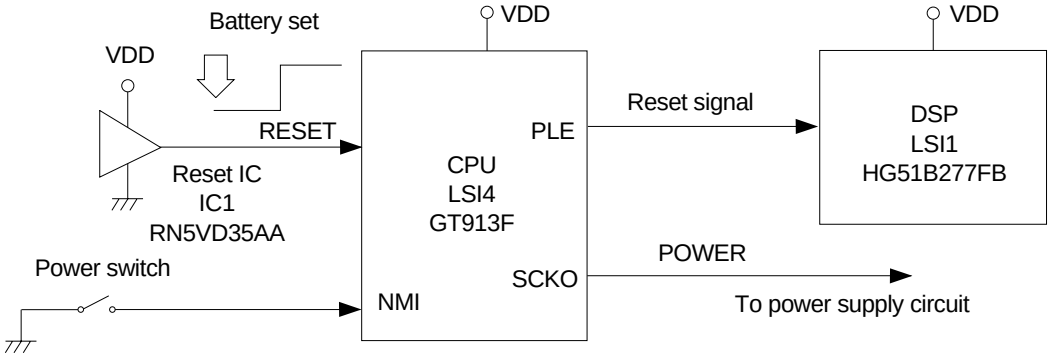
POWER SUPPLY CIRCUIT

The power supply circuit generates five voltages as shown in the following table. VDD voltage is always generated. The others are controlled by POWER signal from the CPU.

Name	Voltage	For operation of
VDD	+5 V	CPU, Reset IC, DSP, Sound source ROM, Working storage RAM, Effect RAM
AVDD	+5 V	DAC, Line in jacks
LVDD	+5 V	Pilot lamp
VCC	+9 V	Line out jacks, Power amplifier
AVCC	+9 V	Pre Amp.

RESET CIRCUIT

When batteries are set or an AC adapter is connected, the reset IC provides a low pulse to the CPU. The CPU then initializes its internal circuit, and clears the working storage RAM.
When the power switch is pressed, the CPU receives a low level signal. The CPU sends POWER signal to the power supply circuit, also sends a reset signal to the DSP.
When the keyboard is powered by batteries and no operation is made for six minutes, CPU drops signal POWER to shut all the voltage except VDD off.



CPU (LSI4: GT913F)

The 16-bit CPU contains a 1k-byte RAM, three 8-bit I/O ports, two timers, a key controller and serial interfaces. The CPU detects key velocity by counting the time between first-key input signal FI and second-key SI from the keyboard. The CPU reads sound data and velocity data from the sound source ROM in accordance with the selected tone; the CPU can read rhythm data simultaneously when a rhythm pattern is selected. Then the CPU provides 16-bit serial sound data to the DSP. The CPU also controls MIDI input/output and stores sequencer data into the working storage RAM.
The following table shows the pin functions of LSI4.

Pin No.	Terminal	In/Out	Function
1	TXD0	Out	MIDI signal output
2	RXD0	In	MIDI signal input
3	SCK0	Out	POWER (APO; Auto Power OFF) signal output
4	TXD1	—	Not used. Connected to ground.
5	RXD1	In	Power ON signal input
6	SCK1	Out	1 MHZ synchronizing pulse output
7 ~ 9	AVCC, AN0, AN1	—	Not used. Connected to ground.
10	AGND	In	Ground (0 V) source
11	BCK	Out	Bit clock output
12	SO	Out	Serial sound data output
13	LRCK	Out	Word clock output
14	GND	In	Ground (0 V) source
15, 16	XLT0, XLT1	In/Out	24 MHz clock input/output
17	VCC	In	+5 V source
18, 19	MOD0, MOD1	In	Mode selection terminal. Connected to ground.
20	RSTB	In	Reset signal input
21	NMI	In	Power ON signal input
22	INT	—	Connected to ground
23 ~ 30	FI0 ~ FI3 SI0 ~ SI3	In	Terminal for key input signal
31 ~ 38	KC0 ~ KC7	Out	Terminal for key scan signal
39 ~ 52	FI4 ~ FI10 SI4 ~ SI10	In	Terminal for key input signal
53 ~ 55	KI0 ~ KI2	In	Terminal for button input signal
56	MWNB	Out	Write enable signal for the DSP
57 ~ 76	MA0 ~ MA19	Out	Address bus
77	MCSB0	Out	Chip enable signal output for the sound source ROM
78	MCSB1	Out	Not used
79	MCSB2	Out	Chip enable signal output for the DSP
80	VCC	In	+5 V source
81	GND	In	Ground (0 V) source
82	MRDB	Out	Read enable signal output for the sound source ROM
83 ~ 98	MD0 ~ MD15	In/Out	Data bus
99	PLE	In	When the keyboard is powered by an AC adaptor, the terminal becomes 0 volt so that the CPU does not send auto power off signal to the power supply circuit.
100	P17	In	Pedal input

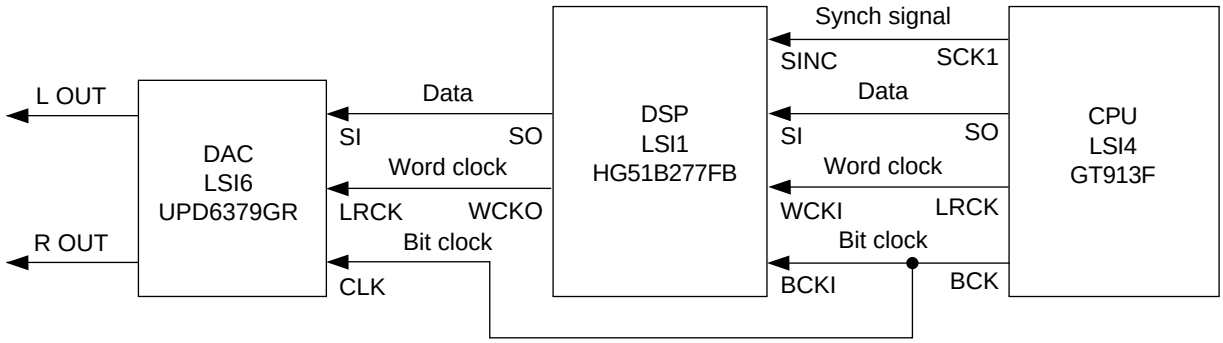
DIGITAL SIGNAL PROCESSOR (LSI1: HG51B227FB)

The DSP receives 16-bit serial sound data from the CPU and adds the selected effect to the sound data using the effect RAM. Then the DSP provides the sound data to the DAC. The DSP also drives LEDs.
The following table shows the pin functions of LSI1.

Pin No.	Terminal	In/Out	Function
1 ~ 4, 80	PB0 ~ PB4	—	Not used.Connected to ground.
5	SO	Out	Serial sound data output for the DAC
6	WCKO	Out	Word clock output for the DAC
7	VDD3	In	+5 V source
8	TEST	—	Not used
9	RESB	In	Reset signal input
10	VSS2	In	Ground (0 V) source
11, 12	XIN, XOUT	In/Out	16 MHz clock input/output
13	WCKI	In	Word clock input from the CPU
14	SI	In	Serial sound data input from the CPU
15	BCKI	In	Bit clock input from the CPU
16	SINC	In	1 MHz synchronizing pulse input
17	VDD2	In	+5 V source
18 ~ 25	IO0 ~ IO7	In/Out	Data bus
26	RCEB	Out	Chip enable signal output for the working storage RAM
27	VSS3	In	Ground (0 V) source
28	AD1	In	Address bus
29	OEB	—	Not used.Connected to ground.
30	WEB	In	Write enable signal
31	VDD3	In	+5 V source
32	CE2	In	Chip enable signal input. High active.
33	AD0	In	Address bus
34	CE1B	In	Chip enable signal input. Low active.
35 ~ 41, 43	EIO0 ~ EIO7	In/Out	Data bus for the effect RAM
42 , 44, 46 ~ 48, 51 ~ 59, 61	EA0 ~ EA14	Out	Address bus for the effect RAM
45	ECEB	Out	Chip enable signal output for the effect RAM
49	EOEB	Out	Read enable signal output for the effect RAM
50	VSS3	In	Ground (0 V) source
60	EWEB	Out	Write enable signal output for the effect RAM
62, 66, 70, 74, 78	VSS2	In	Ground source
63, 67, 71, 75, 79	VDD2	In	+5 V source
64, 65, 68, 69, 72, 73	PA0 ~ PA5	Out	Button scan signal output
76, 77	PA6/7	Out	Not used

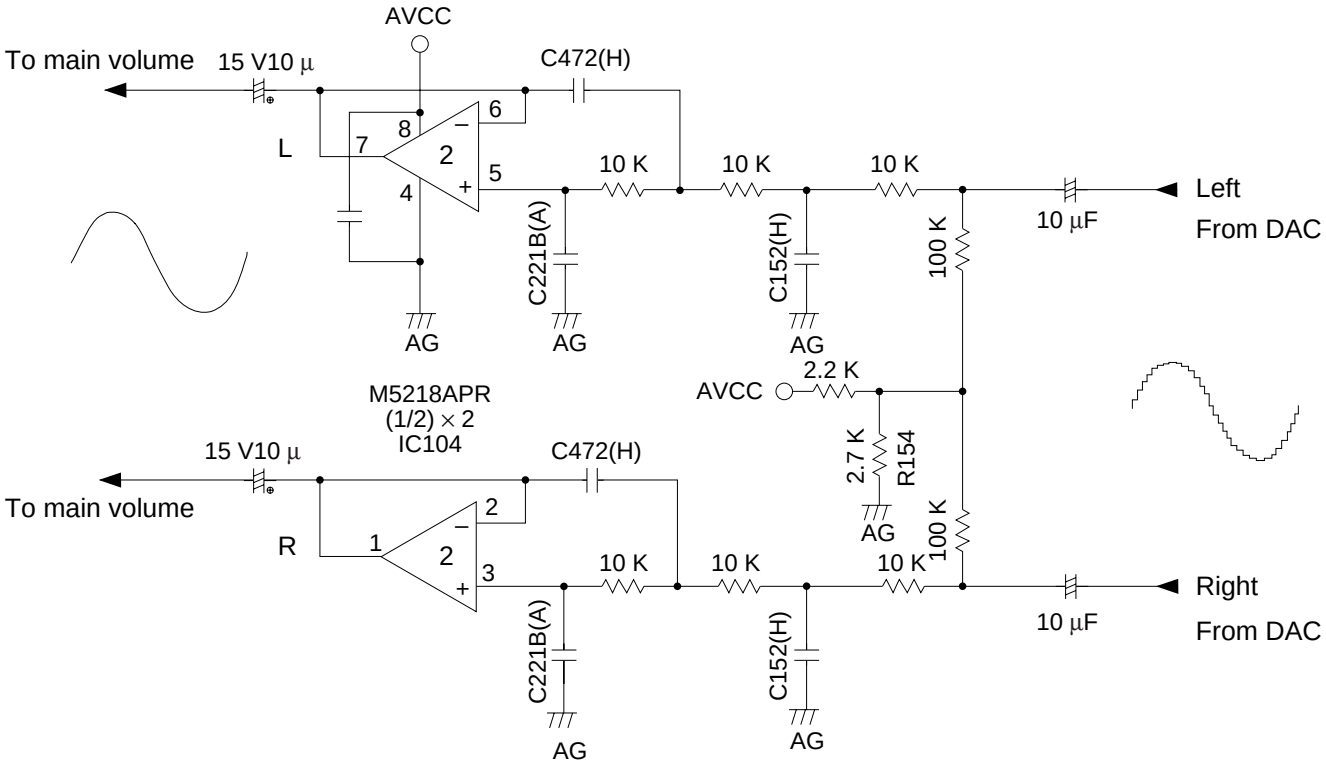
DAC (IC1: UPD6379GR)

The DAC receives 16-bit serial data output from the DSP. The data contains digital sound data of the melody, chord, bass, and percussion for the right and left channels. The DAC converts the data into analog waveforms and output them to each channel separately.



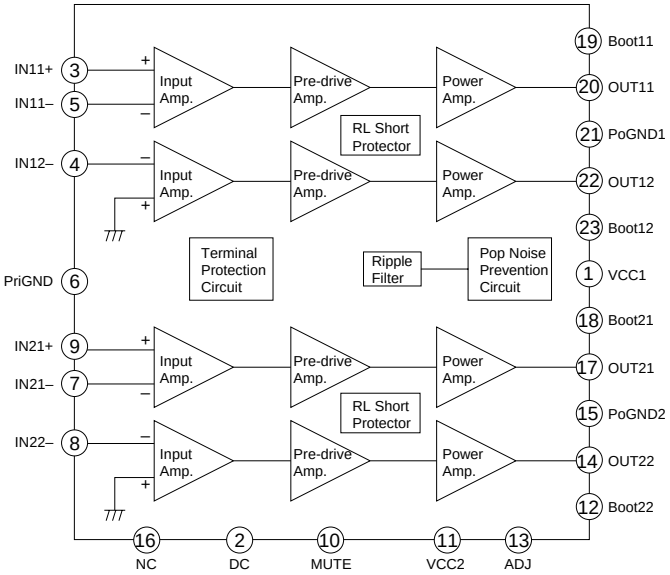
FILTER BLOCK

Since the sound signals from the DAC are stepped waveforms, the filter block is added to smooth the waveforms.

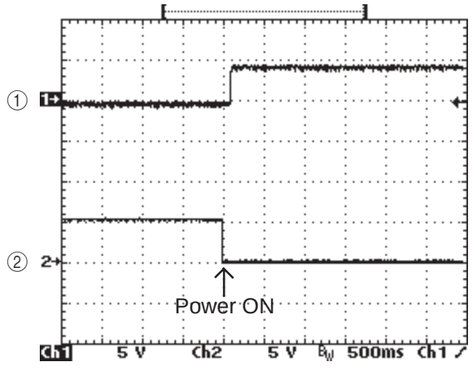


POWER AMPLIFIER (IC101 : LA4620)

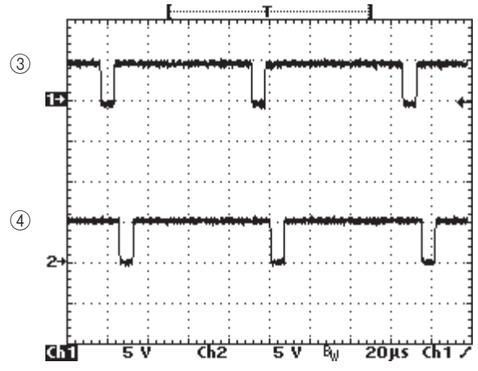
The power amplifier is a two-channel amplifier with standby switch.



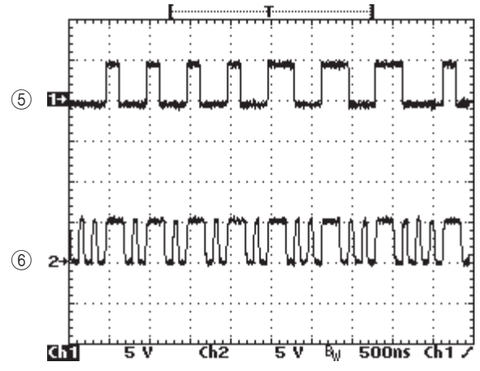
MAJOR WAVEFORMS



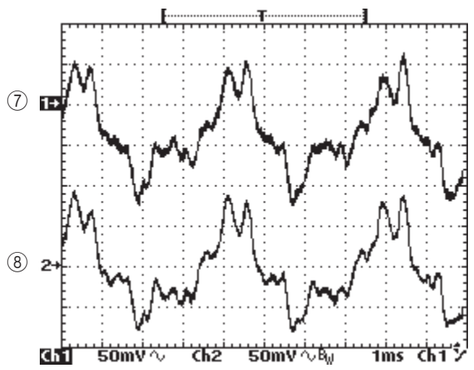
① ADP (POWER) signal
JE connector pin 5
② NMI signal
JE connector pin 7



③ KC0 signal
JD connector pin 15
④ KC1 signal
JD connector pin 14

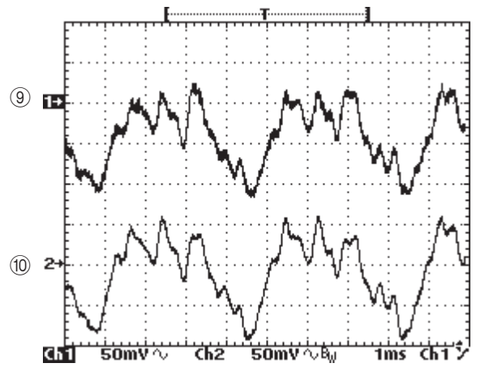


⑤ $\overline{CE}$ (MCSBO) signal
LSI3 pin 12
⑥ $\overline{OE}$ (MRDB) signal
LSI3 pin 14



⑦ DAC output (L-ch)
JE connector pin 12
⑧ DAC output (R-ch)
JE connector pin13

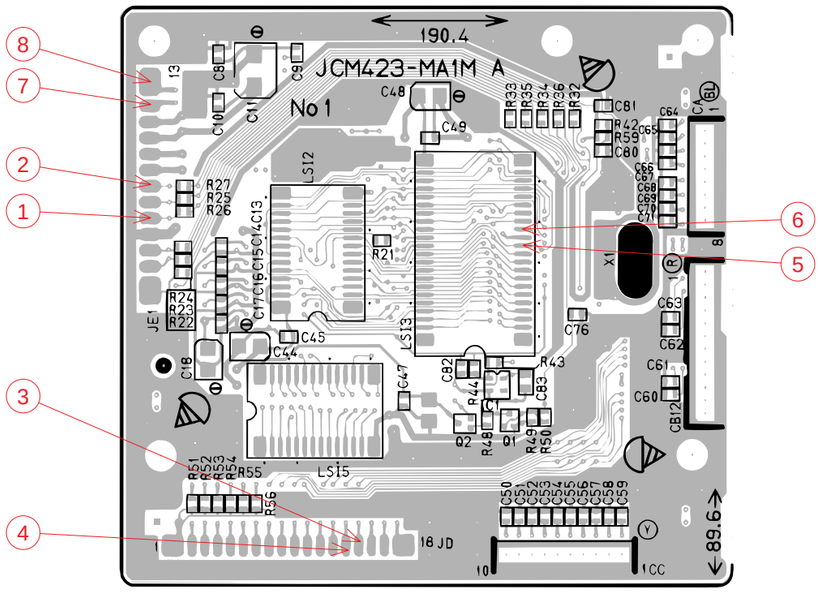
Tone : Strings
Key : A4
Reverb : ON
Volume : Maximum
Touch response : Maximum



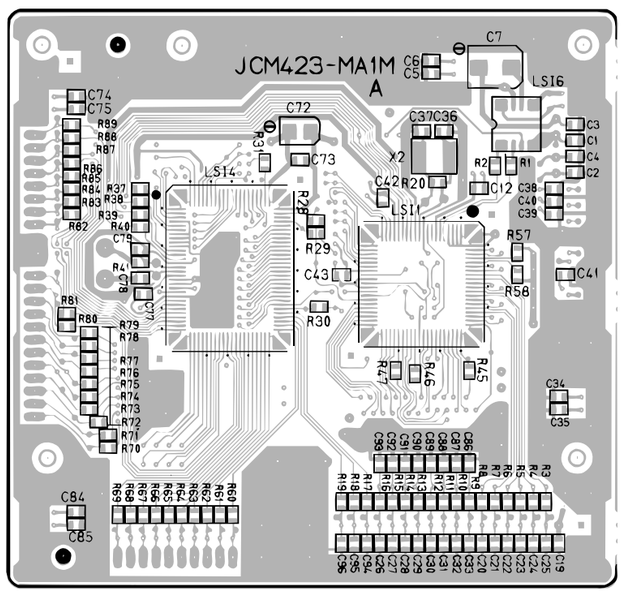
⑨ Sound signal (L-ch)
JF connector pin 7
⑩ Sound signal (R-ch)
JF connector pin 8

PRINTED CIRCUIT BOARDS

Main PCB JCM423-MA1M

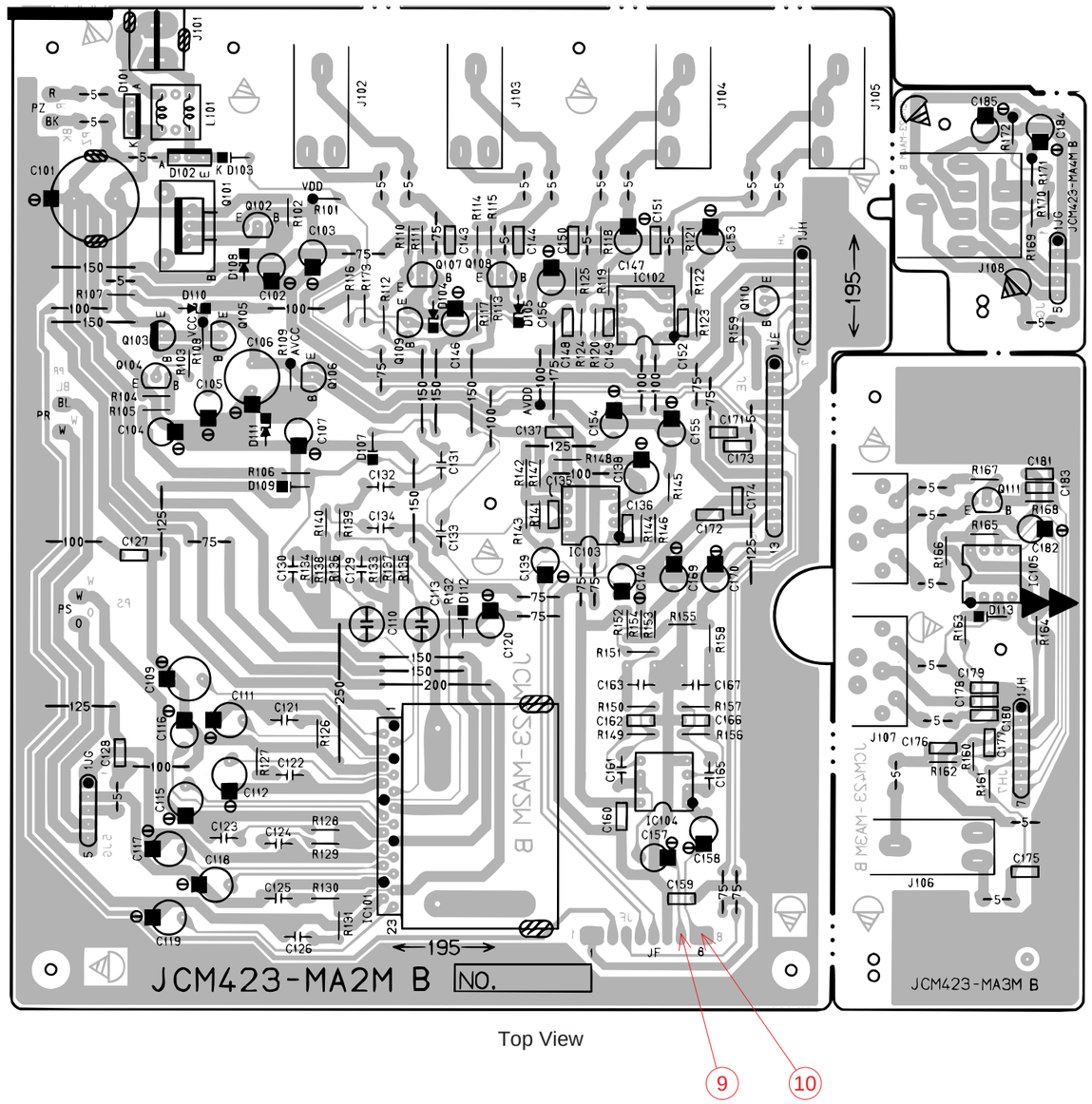


Top View



Bottom View

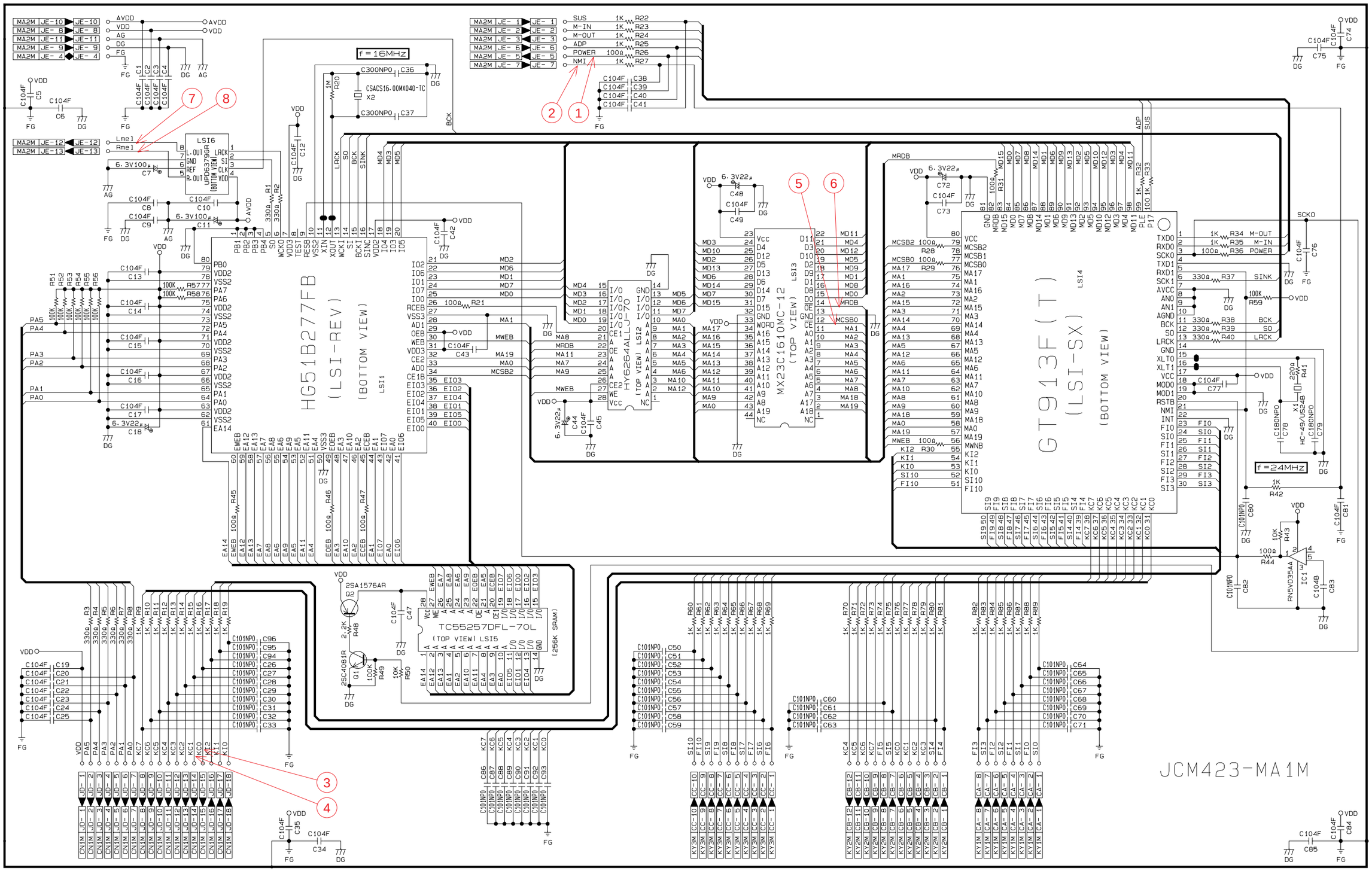
Sub PCBs JCM423-MA2M/MA3M/MA4M



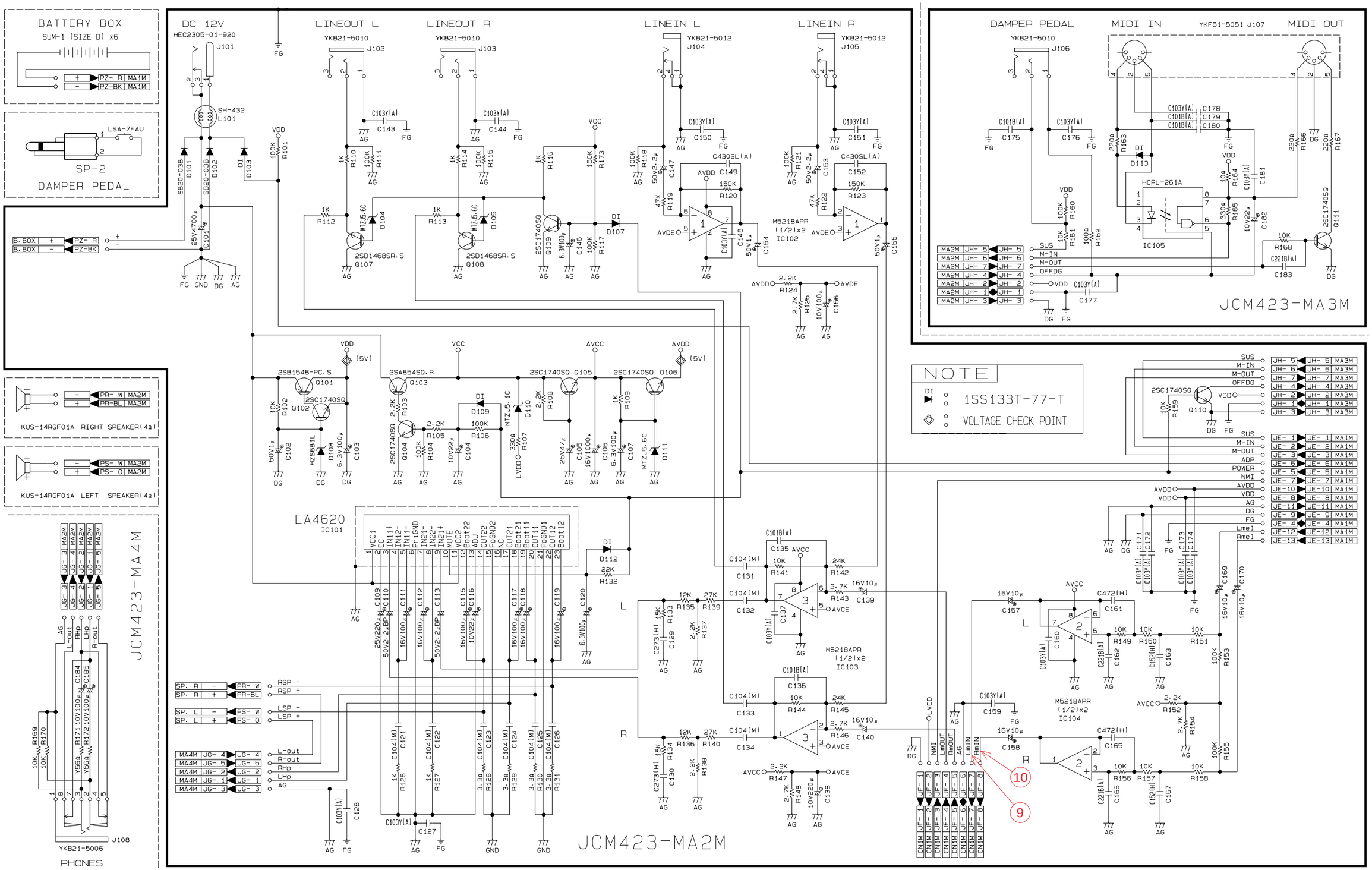
Top View

SCHEMATIC DIAGRAMS

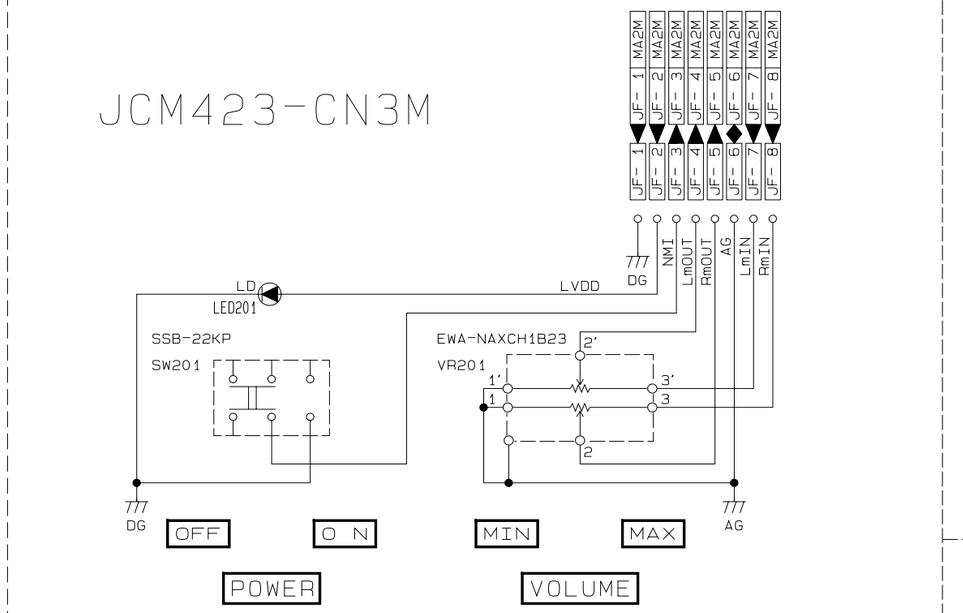
Main PCB JCM423-MA1M

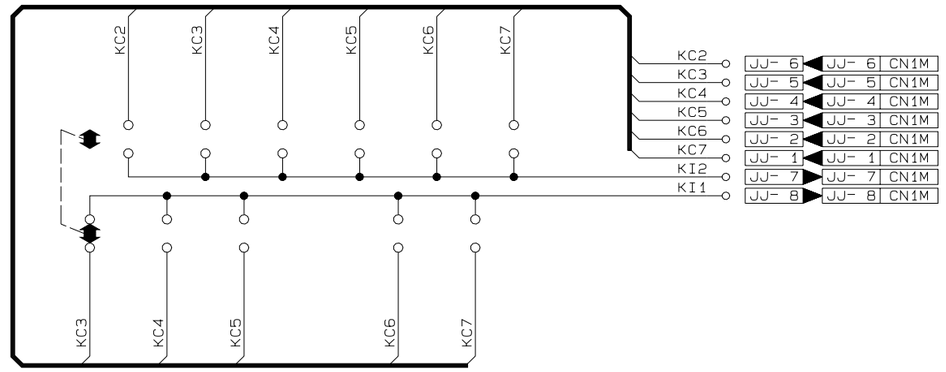


Sub PCBs JCM423-MA2M/MA3M/MA4M



Console PCBs JCM423-CN1M/CN2/CN3M

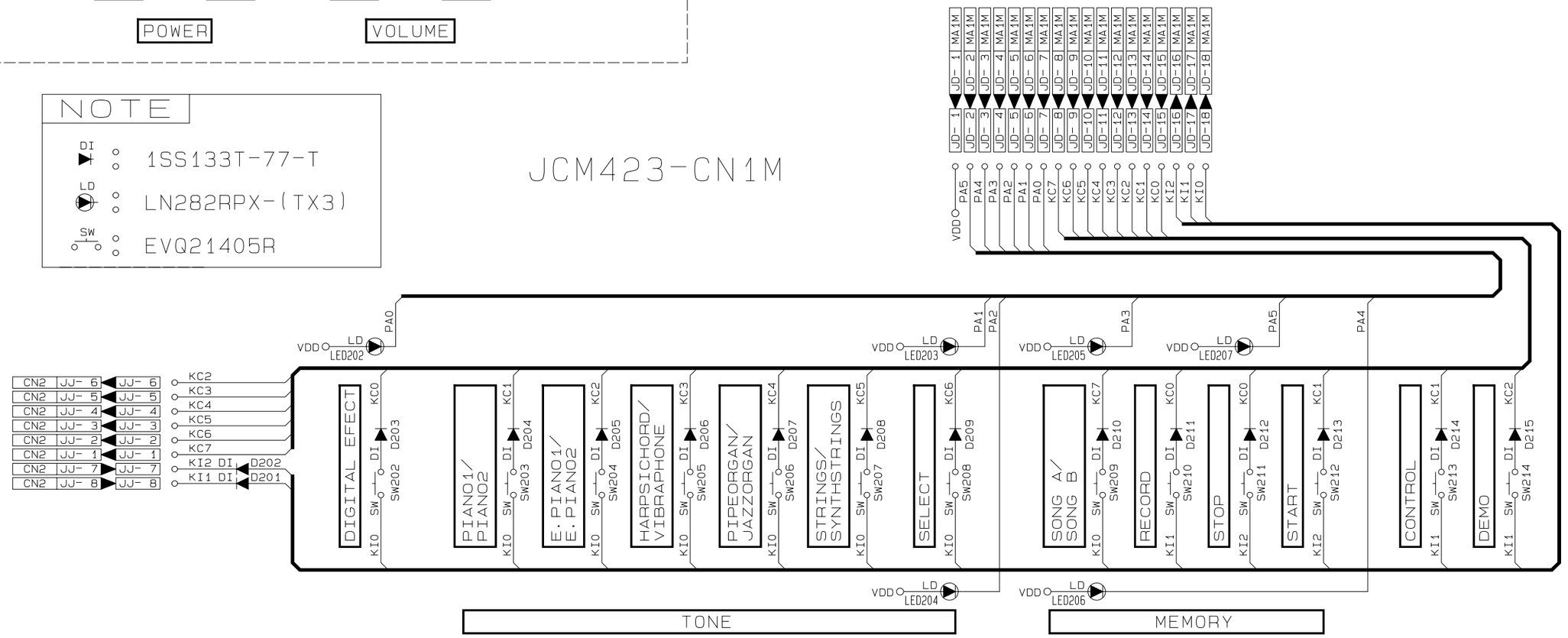




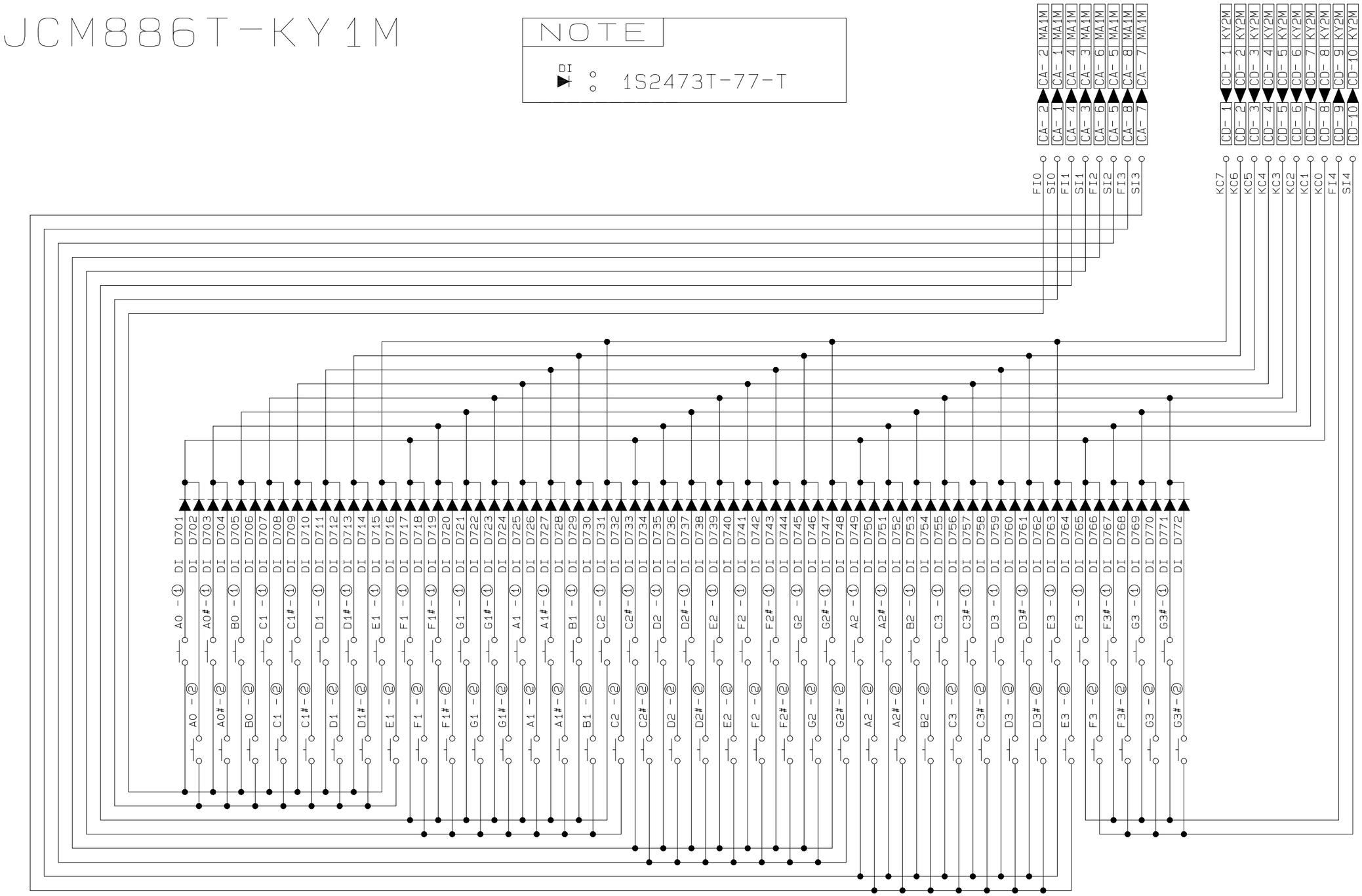
JCM423-CN2

(C-POSITION is no contact)

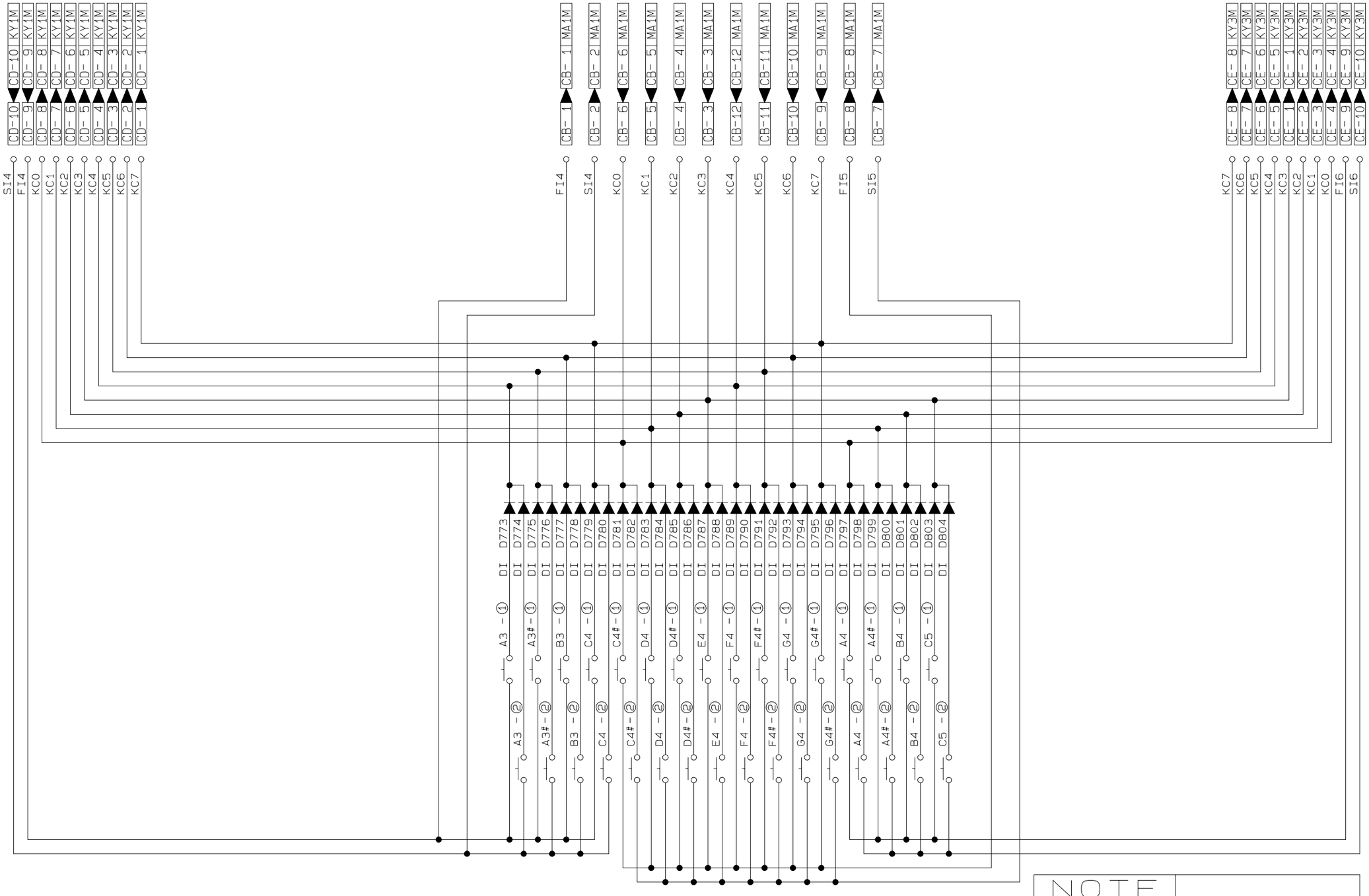
JCM423-CN1M



Keyboard PCB JCM886T-KY1M



Keyboard PCB JCM886T-KY2M

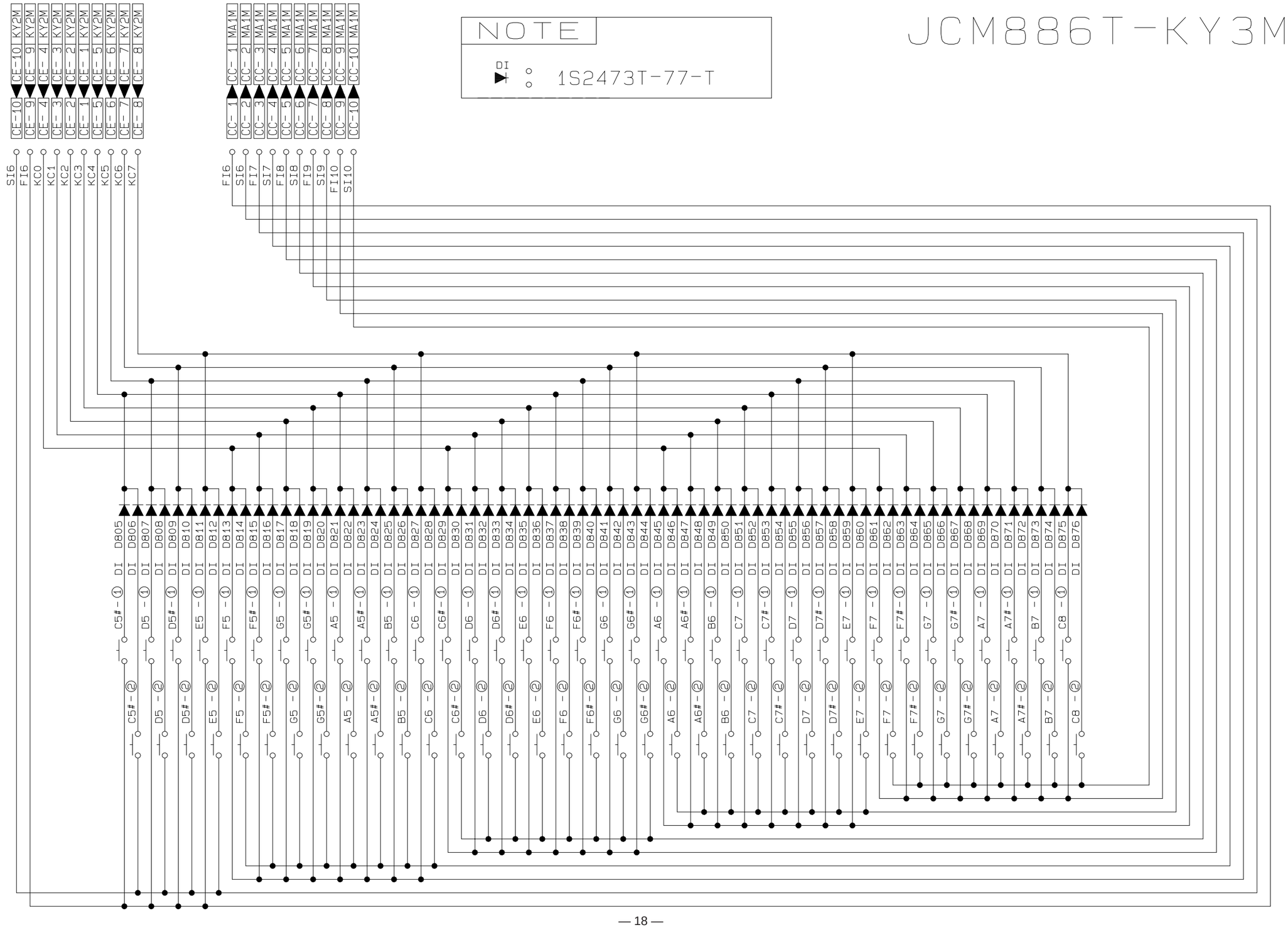


NOTE

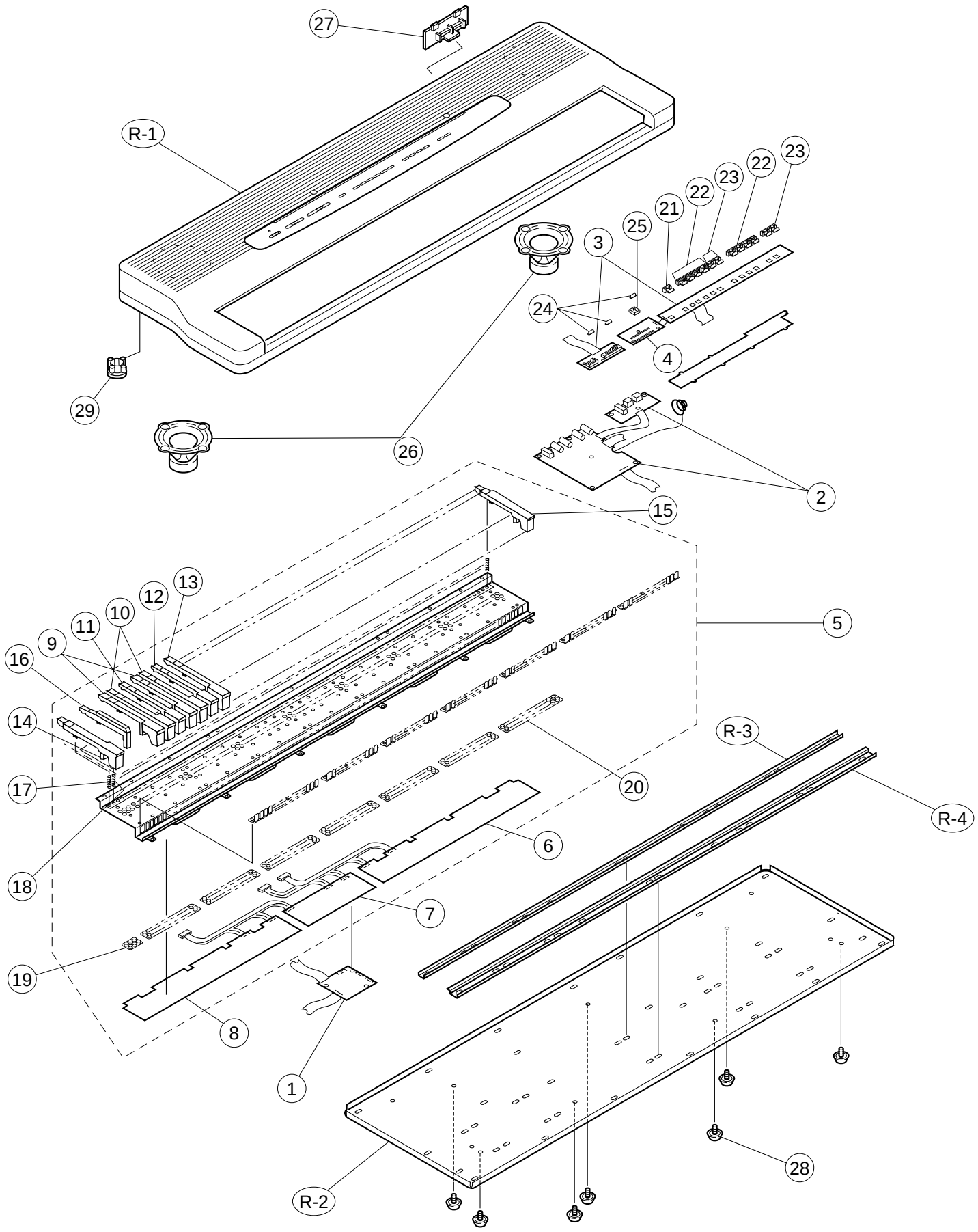
DI : 1S2473T-77-T

JCM886T-KY2M

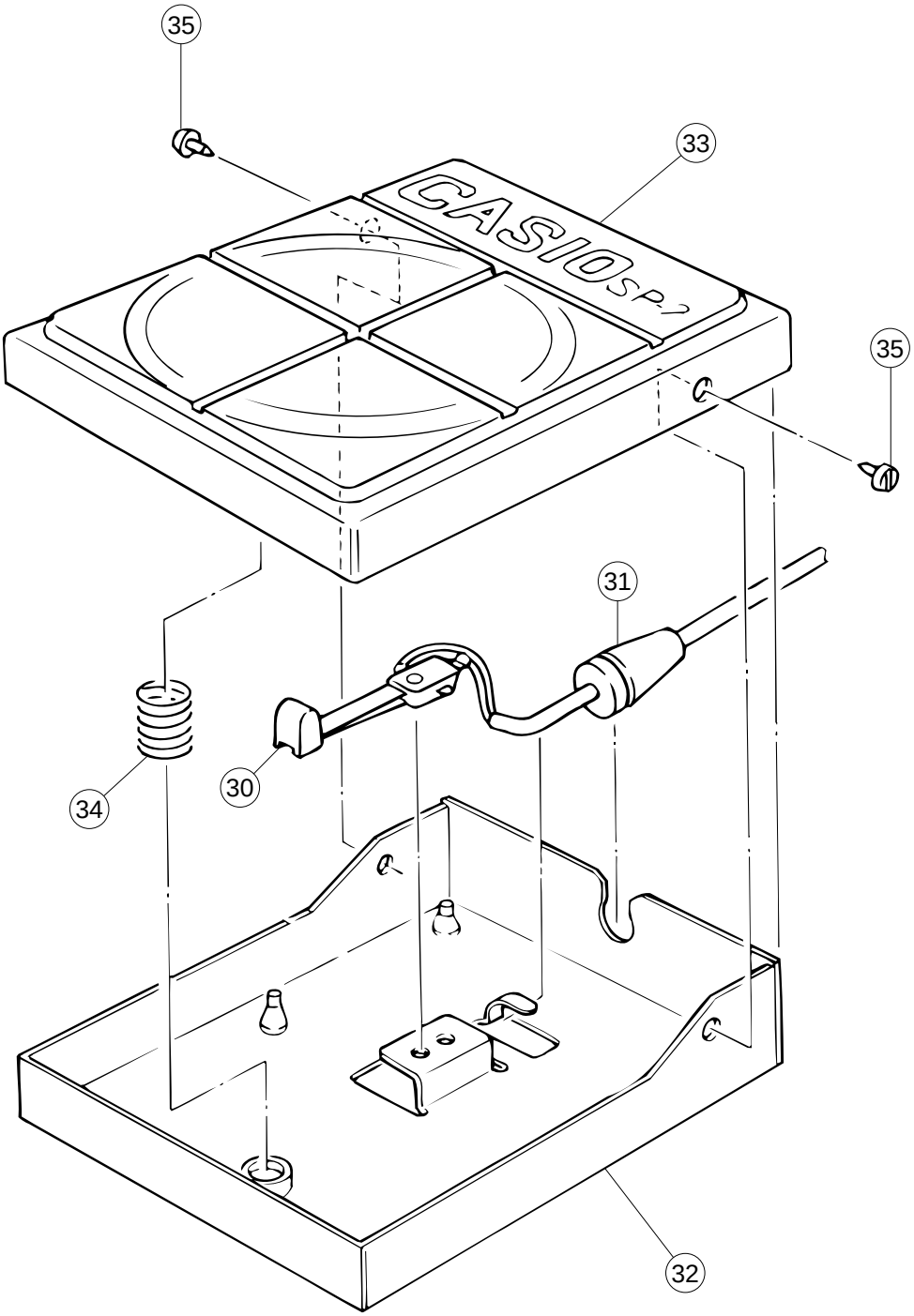
Keyboard PCB JCM886T-KY3M



EXPLODED VIEW



SP-2



PARTS LIST

CPS-85

Notes: This parts list does not include the cosmetic parts, which parts are marked with item No. "R-X" in the exploded view.
Contact our spare parts department if you need these parts for refurbish.

1. Prices and specifications are subject to change without prior notice.

2. As for spare parts order and supply, refer to the "GUIDEBOOK for Spare parts Supply", published seperately.

3. The numbers in item column correspond to the same numbers in drawing.

Item	Code No.	Parts Name	Specification	Q	R
	Main PCB				
1	6925 9150	PCB/ASSY (MA1M)	M240661*1	1	A
LSI1	2012 4494	LSI,DSP	HG51B277FB-1	1	A
LSI2	2012 1764	LSI/S-RAM	LC3564SM-85-TRM	1	A
LSI3	2012 5669	LSI/MASK-ROM	UPD23C16000WGX-C54	1	A
LSI4	2012 5005	LSI,CPU	GT913F(T)	1	A
LSI5	2012 5572	LSI/S-RAM	TC55257DFL-70L(EL)	1	A
LSI6	2105 4746	LSI/D/A CONVERTER	UPD6379GR-E1	1	A
IC1	2105 6340	IC/MOS (RESET IC)	RN5VD35AA-TR	1	B
Q1	2252 0637	TRANSISTOR	2SC4081-T106R	1	B
Q2	2250 1162	TRANSISTOR	2SA1576A-T106R	1	B
X1	2590 2387	OSCILLATOR/CRYSTAL	HC-49/US24B	1	A
X2	2590 2079	OSCILLATOR/CERAMIC	CSACS16.00MX040-TC	1	A
	Sub PCB				
2	6925 9180	PCB/ASSY (MA2,3,4M)	M140596*1	1	B
IC101	2114 1883	IC/LINEAR	LA4620	1	A
IC102 ~ 104	2114 1799	IC/LINEAR	M5218APR	3	B
IC105	2252 1248	IC/PHOTO COUPLER	HCPL-261A	1	B
Q101	2251 0672	TRANSISTOR	2SB1548-P.CS	1	A
Q102,Q104~106, Q109~111	2220 1387	TRANSISTOR	2SC1740SQ-TP-T	7	A
Q103	2250 0168	TRANSISTOR	2SA854-SR-TP-T	1	A
Q107/108	2253 0420	TRANSISTOR	2SD1468SR.S-TP-T	2	A
D101/102	2390 1463	DIODE,SCHOTTKY	SB20-03B	2	B
D102/103/107, D109/113	2390 1344	DIODE	1SS133T-77-T	5	B
D104/105/D111	2360 1946	DIODE/ZENER	MTZJ5.6CT-77-T	2	A
D108	2360 1085	DIODE/ZENER	HZS6B1LTD-T	1	A
D110	2360 1939	DIODE/ZENER	MTZJ5.1CT-77-T	1	A
J101	3501 5012	JACK/POWER	HEC2305-01-920	1	A
J102/103, J106	3612 0789	JACK	YKB21-5010	3	B
J104/105	3612 0584	JACK	YKB21-5012	2	B
J107	3501 4816	JACK/DIN	YKF51-5051	1	B
J108	3612 0665	JACK	YKB21-5006	1	B
	Console PCBs				
3	6925 9190	PCB/ASSY (CN1,3M)	M240662*1	1	B
D201 ~ 215	2390 1344	DIODE	1SS133T-77-T	15	B
LED201 ~ 207	2370 0630	LED	LN282RPX-(TX3)	7	B
SW201	3412 1008	SWITCH/SLIDE	SSB-22KP	1	B
SW202 ~ 214	3412 0903	SWITCH/TACT	EVQ-21405R	13	B
VR201	2765 0952	POTENTIOMETER	EWA-NAXCH1B23	1	A
4	6925 9200	PCB/ASSY (CN2)	M440475*1	1	B
	Keyboard unit				
5	6906 8554	KEYBOARD UNIT	M111412D*2	1	C
6	6925 9210	PCB/ASSY (KY1M)	M140591*1	1	B
7	6925 9220	PCB/ASSY (KY2M)	M240655*1	1	B
8	6925 9230	PCB/ASSY (KY3M)	M140592*1	1	B
9	6921 6290	KEY/WHITE (BE)	M311948*3	15	A
10	6921 6270	KEY/WHITE (CF)	M311948*1	14	A
11	6921 6280	KEY/WHITE (D)	M311948*2	7	A
12	6921 6300	KEY/WHITE (G)	M311948*4	7	A
13	6921 6310	KEY/WHITE (A)	M311948*5	7	A
14	6921 6320	KEY/WHITE (SA)	M311948*6	1	B
15	6921 6330	KEY/WHITE (SC)	M311948*7	1	B

Notes: Q – Quantity per unit
R – Rank

Item	Code No.	Part Name	Specification	Q	R
16	6921 6340	KEY/BLACK	M311949*1	36	A
17	6921 4771	SPRING/KEY (W)	M411982A-1	52	B
18	6906 6352	SPRING/KEY (B)	M411983B-1	36	B
19	6915 8551	RUBBER/CONTACT	M310664A-1	1	A
20	6915 8541	RUBBER/CONTACT	M310663A-1	7	A
D701~876	2301 0101	DIODE	1S2473T-77-1	176	B
	Cases				
21	6919 3281	BUTTON	M311398A-1	1	C
22	6919 3300	BUTTON	M311398-2	2	C
23	6919 4530	BUTTON	M311398-4	2	C
24	6919 3241	KNOB	M311405-1	3	B
25	6909 5890	SWITCH/SLIDE KONB	CSB-12D	1	B
26	3831 0686	SPEAKER	KUS-14RGF01A	2	B
27	6906 8561	COVER/BATTERY	M210564A-4	1	B
28	5530 0488	RUBBER/FOOT	RK-24	7	C
29	6921 4590	CAP	M412064-1	14	C
	Accessories				
	6906 8513	STAND/NOTE	M311787C*4	1	B
	6921 4551	DUST COVER	M311882A-1	1	B
	SP-2 (pedal)				
30	3421 0091	SWITCH/LEAF	LSA-7FAU	1	B
31	3701 0035	PLUG CORD	PM3249-2B	1	B
32	6908 3890	CASE ASSY/LOWER (SP2)	M32349*1	1	C
33	6908 3901	CASE ASSY/UPPER (SP2)	M32348A*1	1	C
34	6908 3910	SPRING	M42928-1	1	C
35	6908 3921	SCREW	M42929A-1	2	C
	CS-81P(stand)				
	6922 6050	STAND	CS-81P	1	C
	1909 7840	SCREW SET	S-CS-81P	1	C

Notes: Q – Quantity per unit
R – Rank

CASIO COMPUTER CO.,LTD.
Service Division

8-11-10, Nishi-Shinjuku
Shinjuku-ku, Tokyo 160, Japan
Telephone: 03-3347-4926

MA0700571A